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ANNUAL FLOOD REPORT 1992



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ANNUAL FLOOD REPORT 1992

IRRIGATION & WATERWAYS DIRECTORATE
GOVERNMENT OF WEST BENGAL

CALCUTTA JANUARY 1993

ANNUAL FLOOD REPORT OF WEST BENGAL
FOR THE YEAR - 1992

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INTRODUCTION

The State of West Bengal consists of a combination of land varying from the high hills on the north to the Seas on the South. With the Tropic of Cancer running across it, the State is located between $21^{\circ}31'$ and $27^{\circ}13'15''$ North latitudes and $85^{\circ}45'20''$ and $98^{\circ}53'$ East longitudes, The geographical area of the State is about 87,853 Sq.Km. Flood season in State starts from 15th June and extends upto 15th October.

CLASSIFICATION OF AREAS.

1. Geographical area = 87,853 Sq.Km.
2. Area under forest = 11,880 "
3. Total flood prone area = 37,660 "
The State of West Bengal consists of a combination of land
4. Area already protected = 26,500 "
varying from the high hills on the north to the Seas on the

1.1 RIVER BASINS

The State can be demarcated into three district drainage basins, coming under the Ganga, Brahmaputra and Subarnarekhs river systems respectively. The aforesaid main basins in turn can be divided into Sub-basins having individual catchments of their own.

The area wise distribution of the above main basins in the State

<u>CLASSIFICATION OF AREAS.</u>		
is as under :-	1) Brahmaputra Basin	-14,208 Km ²
1. Geographical	2) Ganga basin including Sundarbans area.	= 87,853 Sq.Km.
2. Area under forest	3) Subarnarekha Basin.	= 11,880 Km ²

1.2 RIVER SYSTEMS

1.2.1. Brahmaputra Basin Drainage the northern regions of the

State, the rivers within the Brahmaputra system comprise a total area of 14,208 Km² the main rivers being Sankosh, Raidak, Torsa, Kaljani, Jaldhaka, Teesta,

The different tributaries of these rivers are listed below :-

- | | | | |
|----|----------|---|--|
| A. | Sankosh | - | Chiklajhore |
| B. | Torsa | - | Raidak-I, Raidak-II, Turturi. |
| C. | Torsa | - | Kaljani, Sil-Torsa, Char, Torsa, Sanjai, Holong, Ghargharia, Goram, Dina, Pana, Jainti, Gabur Basra. |
| D. | Jaldhaka | - | Mujnai, Murti, Diana, Sutanga, Dolong, Dharala, Ghatia, Kumlai, Gilandi, Buduya. |
| E. | Teesta | - | Great Rangeet, Rammam, Rangpo, Relli, Lish, Ghish, Chel, Mal, Neora, Karali. |

Brief description of the above rivers.

A. * Sankosh It is the eastern most river under Brahma-putra system in this State and serves as the natural boundary between West Bengal and Assam. After being joined by Raidak-II, it outfalls into Brahmaputra in Bangladesh by the name Gangadhar. The river has its origin in Bhutan.

B. Raidak. Originate in Mt. Akungphu at an altitude 6400 Min Bhutan. The River bifurcate into two channels at Bhutan-ghat, close to Indo-Bhutan border. One of the branches, namely Raidak-I joins the united stream of Torsa and Kaljani, while the Raidak-II is joined by Sankosh and outfalls into Brahmaputra in Bangladesh by the name Gangadhar.

C. Torsa. The river Torsa rises in Chumbi Valley of Southern Tibet at an altitude of 7065 M. It flows through Tibet, Bhutan, West Bengal and Bangladesh. Below Hasimara Bridge (on NH 34), it bifurcates into two channels, viz. Sil-Torsa and Char-Torsa. They reunite at Patlakhowa Forest. The river passes by the Coochbehar town and is joined by Kaljani river and Raidak-I. The combined flow outfalls into Brahmaputra near Nageswari at Rangpur in Bangladesh.

Contd.....2a.

D. Jaldhaka. The river has its origin from Bitang lake in Sikkim at an altitude of 4400M. It flows through Sikkim, Bhutan, West Bengal and Bangladesh. After the river is joined by a number of streams and tributaries both in the mountaneous and Sub-mountaneous regions, it finally flows into Dharals river and the combined stream, getting the name Dharala ultimately outfalls into Bhrahmaputra in Bangladesh.

E. Teesta. Teesta originates in the glaciers of North Sikkim at an altitude of 6400 M and is formed by the union of two streams viz. Lachen and Lachung at Chungthung in Sikkim. It enters West Bengal at Rangpo and upto Melli, it forms the boundary between West Bengal and Sikkim. Two of its tributaries, viz. Great Rangit and Ramman, also serve as the natural boundary between the West Bengal and Bangladesh. After the river is joined by a number of streams and tributaries both in the mountaneous and Sub-mountaneous regions, it finally flows into Dharals river and the combined stream, getting the name Dharala ultimately outfalls into Bhrahmaputra in Bangladesh.

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1.2.2 GANGA BASIN

The Central, Southern and the South-Western parts of the State of West Bengal constitute the Ganga Basin. The Ganga, only a stretch of which is now flowing through the narrow central waist-line of the present shape of this State had been an active delta builder.

The Ganga system comprise a total area of 71,485Km² within the State of West Bengal. The catchment areas different rivers within this system in the State of West Bengal are as under :-

<u>Sl.No.</u>	<u>Name of river Sub-Basins.</u>	<u>Catchment area in Km²</u>
A.	Mahananda	9460
B.	Punarbhaba	730
C.	Atrai	910
D.	Pagla-Bansloi	730
E.	Dwarka-Brahmani	2500
F.	Bhagirathi-Hooghly	1170
G.	Jalangi	5344
H.	Mayurakshi	2720
I.	Ajoy	2490
J.	Khari-Gangur-Ghea	1302
K.	Churni	800
L.	Damodar	5250
M.	Dwarakeswar	4430
N.	24(South & North) Farganas and Calcutta Port Drainage Basin.	4330
O.	Kangsabati	8369
P.	Silabati	3952
Q.	Rupnarayan	2548
P.	Fichban	820
S.	Rasulpur	1130
T.	Haldi	980
U.	Tidal Zone(Sundarbans areas)	11320

The different tributaries of these rivers are listed below :-

1. Mahananda-Mechi, Balasan, Dauk, Nagar, Kulik, Gamar, Chirmati, Tangon,
2. Punarbhaba- Punarbhaba.
3. Atrai-- Atrai.

- 4) Tagla-Baslloi Tagla, Bansloi, Bagmari.
- 5) Brahmani-Dwarka -- Brahmani, Dwarka.
- 6) Bhagirathi-Hooghly -- Bhagirathi, Hooghly.
- 7) Jalangi -- Jalangi, Silamari, Bhairab, Suti.
- 8) Mayurakshi -- Mayurakshi, Babla, Noon Beel, Siddheswari, Kuiya, Bakreswar, Kopai, Sal, Monikarnia, Daoki, Kana Mor, Gambhira.
- 9) Ajoy -- Ajoy, Hinglow, Kunoor.
- 10) Khari-Gangur-Ghea -- Khari, Brahmani, Banka, Bangur, Ghea, Behula, Kana.
- 11) Churni Churni.
- 12) Damodar -- Damodar, Barakar, Sali.
- 13) Dwarakeswar -- Gandheswari, Arksha, Berai, Dwarkeswar.
- 14) Rupnarayan -- Mundeswari, Dwarkeswar, Gandheswar, Berai, Damodar, Tarjuli, Sankari, Silabati, Joypanda, Kubai, Parang, Kanki.
- 15) Haldi -- Haldi, Kangsabati, Kumari, Bhairab, Banki, Tarafeni, Kaliaghai, Bagchai, Chandia, Kapaleswari.
- 16) Rasulpur -- Rasulpur, Pichaban.
- 17) Tidal Rivers. -- Tolly's Nullah, Keorapukur, Ichamati, Raimangal, Kultigong, Jamuna, Kalindi, Haria Bhanga, Gosaba, Metia, Fiali, Thakurani, Raidighi, Saptamukhi, Muri Ganga.

E.O.L. 21.64 M.

D.L. 21.03 M.

DATUM 19.00 M.

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28.8.92
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RIVER-GANGA-GAUGE STN-NOORPUR-DIST. MURSHIDABAD

E.O.L. 9.05 M.

D.L. 8.44 M.

DATUM 6.00 M.

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RIVER-JALANGI-GAUGE STN. SWARUPGAN-DIST-NADIA

E.O.L. 21.30 M.

D.L. 20.40 M.

DATUM 18.00 M.

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RIVER-DWARKA-GAUGE STN.-SANKOGHAT-DIST BIRBHUM

E.O.L. 19.05 M.

D.L. 18.44 M.

DATUM 16.00 M.

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RIVER-BHIRAB-GAUGE STN-AKHERGANJ-DIST MURSHIDABAD

D.L. 7.00 M.

DATUM 6.00 M.

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RIVER-KALIAGHAYE-GAUGE STN-DEHATI-DIST-MIDNAPORE

D.L. 5.33 M.

DATUM 4.00 M.

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RIVER-KAPELESWARI-GAUGE STN-NARAYANBAR-DIST MIDNAPORE

E.O.L. 42.00 M.

D.L. 40.00 M.

DATUM 30.00 M.

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RIVER-MUNDESWARI-GAUGE STN. HARINKHOLA-DIST. HOOGHLY

R.S.P.A. 47.90 (M)
R.S.U.P.A. 47.60
Y.S.P.A. 47.00
Y.S.U.P.A. 46.70 (M)

DATUM (M)
43.00

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RIVER - RAIDAKI - GAUGE STATION - L.R.P. CROSSING - DIST - COOCH BEHAR

R.S.P.A. 49.30 (M)
R.S.U.P.A. 49.00 (M)
Y.S.P.A. 48.40 (M)
Y.S.U.P.A. 48.10

DATUM (M)
44.00

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RIVER - RAIDAKI - GAUGE STN - L.R.P. CROSSING - DIST - COOCH BEHAR

R.S.P.A. 48.76 M
Y.S.P.A. 48.20 M
R.S.U.P.A. 45.70 M
Y.S.U.P.A. 45.10 M

DATUM 42.00 M

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RIVER - KALJANI - GAUGE STN - ALIPURDWAR - DIST - COOCH BEHAR

RS.PA.49.0M
R.SUPA.49.0M

Y.S.U.PA.48.20M
Y.S.PA.48.80M

E.D.L.26.21M

DL.25.60M

DATUM 44.00M

DATUM 21.00M

DATE

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30.6.92 1.7.92 2.7.92 3.7.92 4.7.92 5.7.92 6.7.92 7.7.92 8.7.92 9.7.92 10.7.92 11.7.92 12.7.92 13.7.92 14.7.92 15.7.92 16.7.92 17.7.92 18.7.92 19.7.92 20.7.92 21.7.92 22.7.92 23.7.92 24.7.92 25.7.92 26.7.92 27.7.92 28.7.92 29.7.92 30.7.92 31.7.92 1.8.92 2.8.92 3.8.92 4.8.92 5.8.92 6.8.92 7.8.92

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RIVER-SANKOSH - GAUGE STN.-L.R.P. CROSSING-DIST.-COOCH BEHAR

RIVER-TANGON - GAUGE STN - BANSIHARI-DIST-W. DINAJPUR

H.F.L.24.85M

E.D.L.23.77M

D.L.22.25M

DATUM 21.00M

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17.8.92 18.8.92 19.8.92 20.8.92 21.8.92 22.8.92 23.8.92 24.8.92 25.8.92 26.8.92 27.8.92 28.8.92 29.8.92 30.8.92 31.8.92 1.9.92 2.9.92 3.9.92 4.9.92 5.9.92 6.9.92 7.9.92 8.9.92 9.9.92 10.9.92 11.9.92 12.9.92 13.9.92 14.9.92 15.9.92 16.9.92 17.9.92 18.9.92 19.9.92 20.9.92 21.9.92 22.9.92 23.9.92 24.9.92 25.9.92

RIVER-GANGA - GAUGE STN. - FARAKKA-DIST.-MURSHIDABAD

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

MATHON RESERVOIR
RESERVOIR LEVELS IN (M)
SCALE: 2 M = 1 CM
D.S.M.
15.482 M.

MAXIMUM WATER LEVEL: 50.876 M.

PANCHET RESERVOIR
RESERVOIR LEVEL IN (M)
SCALE: 2 M = 1 CM
D.S.M.
15.482 M.

MAXIMUM WATER LEVEL: 35.035

MASSEJORE RESERVOIR
RESERVOIR LEVEL IN (M)
SCALE: 2 M = 1 CM
D.S.M.
15.482 M.

MAXIMUM WATER LEVEL: 23.741

KANGSABATI RESERVOIR
RESERVOIR LEVELS IN (M)
SCALE: 2 M = 1 CM
D.S.M.
120.42 M.

MAXIMUM WATER LEVELS: 35.67 M.

BRITISH MADE

15.6 16.6 17.6 18.6 19.6 20.6 21.6 22.6 23.6 24.6 25.6 26.6 27.6 28.6 29.6 30.6 1 7 27 37 47 57 67 77 87 97 107 117 127 137 147 157 167 177 187 197 207 217 227 237 247 257 267 277 287 297 307 317 1 8 28 38 48 58 68 78 88 35 108 118 128 138 148 158 168 178 188 198 208 218 228 238 248

MAITHON RESERVOIR
RESERVOIR LEVELS IN(M).
SCALE: 2M = 1CM.

D.S.L.
150.00

MAXIMUM WATER LEVEL - 180.026 M.

PANCHET RESERVOIR
RESERVOIR LEVELS IN(M).
SCALE: 2M = 1CM.

D.S.L.
154.82(M)

MAXIMUM WATER LEVEL - 135.659 M.

MASSENJORE RESERVOIR
RESERVOIR LEVELS IN(M).
SCALE: 2M = 1CM.

D.S.L.
150.00

MAXIMUM WATER LEVEL - 123.7 M.

KANGSABATI RESERVOIR
RESERVOIR LEVELS IN(M).
SCALE: 2M = 1CM.

D.S.L.
120.42 M.

MAXIMUM WATER LEVEL - 150.47 M.

RESERVOIR LEVELS DURING
FLOOD SEASON 1992
SHEET NO - 1/2

A Brief note on the above Sub-basins.

- 1) Mahananda- The river Mahananda originates from Taglajhora near Kurseong town. It bifurcates into two channels, viz. Fulahar branch which flows through Bihar and Bansloi Branch which flows through West Bengal. At places, it forms the Indo-Bangladesh border. Mahananda carrying the flow of four tributaries, namely Nagar, Kalindri, Tangon and Dunarbhaba, drains into Ganga from the north-Western side at Godogarighat just downstream of the point where Ganga leaves the boundary of West Bengal.
- 2) Atrai :- Dunarbhaba- Some rivers like Sahu, Nim, Talma, Chani, Fanga originate from the highlands in the district of Jalpaiguri. They gradually meet together afterwards, the combined stream assumes the name Karatowa. It then enters Bangladesh where it assumes the name Atrai and bifurcates into two channels viz. Dhepa and Atrai.

The eastern channel i.e. Atrai reenters West Bengal in Kumarganj F.S., of West Dinajpur district. Covering some 40 Kms length in the State it reenters into Bangladesh and ultimately outfalls into Brahmaputra.

The Dhepa on the other hand taking a south-western course enters Gangarampur F.S. in West Bengal district, assuming the name Funarhaba. Covering some 40 Kms in length in West Dinajpur district, it touches the eastern boundary of Malda District and enters Bangladesh. Further down, it meets Mahananda in Bangladesh.

3) Nagar-Kulik-Gamari Chirmati Tangon Kalindri.

These rivers flow through Malda and West Dinajpur Districts. Somewhere they form the boundary either between West Bengal and Bihar or between West Bengal and Bangladesh.

The ultimately outfall into Mahananda.

The Dhepa on the other hand taking a south-western course enters Gangarampur F.S. in West Bengal district, assuming the name Funarhaba. Covering some 40 Kms in length in West Dinajpur district, it touches the eastern boundary of Malda District and enters Bangladesh. Further down, it meets Mahananda in Bangladesh.

Nagar originating in Bangladesh flows along the boundary with West Bengal. Taking a southernly course, it receives a spill channel of Mahananda and is joined by Kulik which has also its origin in Bangladesh. The Gamari and Chirmati are two other small rivers that flow through West Dinajpur district before meeting the combined stream which ultimately outfalls into Mahananda.

3) Tangon is a tributary to Mahananda. It rises in Bangladesh. After flowing through the districts of West Dinajpur and Malda, it meets Mahananda on the boundary of Malda and Bangladesh.

West River Kalindri has its origin in the North Bihar,

- 4) Paola-Bansloi-Brahmani. These rivers rise in Rajmahal hills of Bihar. Flowing eastward across Birbhum district, they enter Murshidabad district as the tributaries of Bhagirathi.
- 5) Jalangi-Bhairab. Jalangi takes off from the right bank of river Padma in Murshidabad district, 165 Kms. downstream of Farakka. It is dead for all purposes, except during the rains when it receives water from Padma. The river ends its journey by finally out falling into Hooghly near Nabadwip town. In its lower stage of journey, it is also known as Kharia.
- Bhairab takes off from Ganga in P.S. Lalbagh of Murshidabad district. It is now almost a dead channel but during rainy season for a few days, it receives water from Padma.
- 6) Ichamati-Churni. River Mathabhanga rises near to the mouth of the Jalangi on the Padma. It is not an important river in this State as it flows mainly in Bangladesh. It flows only a few Kms. within Nadia district. At this stage, the river bifurcates into two channels, the Western branch, i.e. Churni runs a few Kms in the district in a south-West direction to meet Bhagirathi. The other branch is known as Ichamati which gets little supply from ~~Makxxx~~ Mahananda and thrives on wash-outs and tidal flows.
- 7) Bhagirathi Hooghly. Bhagirathi or Hooghly is the main river in the State. It is in fact the main artery of flow. Before the 12th century, the Ganga had its main course down Bhagirathi-Hooghly. Subsequently, the main flow was pushed to the east through the present course of Padma. The flow of Bhagirathi increases down stream due to the run off and outflow from a number of eastern and western tributaries.

After its confluence with Jalangi, Bhagirathi is known as Hooghly and forms the boundary between 24-Parganas (North and Hooghly districts).

8) Mayurakshi-Babla.

Mayurakshi originates from the high lands of Santhal Parganas. It is the main river in Birbhum district. Carrying flows of different tributaries, its outfalls into Hijol Beel of Murshidabad district. Babla takes off from the Beel and drains into Bhagirathi.

9) Ajoy :- It rises in the hills near Deoghar in Bihar. The principal tributaries of this river are Patro, Janiti, Darua, Kunoor and Hinglow.

10) Lamodar :- It rises in the Lalaman hills in Bihar. The river bifurcates into two channels at Beguahana. The main flow passes through Mundeswari channel and discharges into Rupnarayan. The other one, Amta channel carries discharge during high floods and outfalls into Hooghly.

11) Dwarkeswar-Silabati-Rupnarayan.

The lower tidal reach below the confluence of Dwarkeswar and Silabati is known as Rupnarayan. After receiving the main flow of Lamodar through Mundeswari and a branch of Kangsabati i.e. Old Cossye or Dalasai Khal, it ultimately outfalls into Hooghly. The river is tidal throughout its entire course.

Dwarkeswar rises from the highlands of Purulia district. River Gandheswari rising from Bankura district meets Dwarkeswar near Bankura town. Receiving waters of other streams like Arkasha, Berai, it enters Hooghly district and meets Silabati to form Rupnarayan.

Silabati originating in Purulia district, receiving water of Joypanda and after traversing through Midnapore district, it meets Dwarkeswar.

12) Kangsabati-Kaliaghai-Haldi.

River Kangsabati rising in Purulia district is joined by Kumari in Bankura district. Further down, it is joined by the combined stream of Bhairab Banki and Tarafeni rivers and thereafter flows on through the Midnapore district. After a tortuous course, it bifurcates, the upper branch known as Old Cossye or Talaspai Khal outfalls into Rupnarayan.

River Kalaighai trickles out from Jhargram F.S. in Midnapore district. Along its journey, it is fed by the flow of tributaries Kapaleswari, Baghai and Chandia. The combined flow meets the another arm of Kangsabati, i.e. New Cossye to form Haldi which falls into Hooghly.

13) Rasulpur :- It is a river of Contai Sub-Division of Midnapore district formed by the three streams Bagda, Sarpai and Madhakhati and ultimately meets Hooghly.

14) Tidal rivers of Southern West Bengal.

Apart from the rivers described earlier within Ganga and Brahmaputra system, there is a group of rivers in southern part of the state which fall in the tidal zone. These rivers mostly lie in the deltaic zone to the east of Hooghly river popularly known as Sundarbans and form an intricate network with a number of criss-cross into connecting Channels, thus dividing the land into a number of islands. Most of these rivers were originally spill channels of Ganga, then upland supply running dry during winter months. But gradually their oftakes from Ganga have deteriorated and in some cases being cut-off from the parent river. Now these rivers drain off whatsoever fresh discharge comes

Country side, thus ultimately draining into Bay of Bengal through one or other of the principal estuaries in the area which are, starting from Hooghly river successively the Barata of Muriganga or Channel Creek, Saptamukhi, Thakuran, Matla, Gosa, Hariabhanga, Raimangal etc.

The Tolly's Nullah or the Adi Ganga, as it is sometime called is a small but important tidal creek draining into the Hooghly from the left in the vicinity of the city of Calcutta.

1.2.3. SUBARNAREKHA BASIN.

The river Subarnarekha, though it has every small catchment within this State has got separate entity as it direct falls into the Bay of Bengal. It has its origin in the hills of Chatanagpur range at an elevation of 609m. It drains a total areas (of 18,951 Km² (13,950 Km²) in Bihar, 2160 Km² in West Bengal and 3201 Km² in Orissa) The main tributaries of the river are Kanchi and Kharkai above Chandil in Bihar, Khakhai in Bihar and Orissa and Dolong in West Bengal.

2. RAINFALL :-

The main rainfall season in this State is the southwest monsoon season during which the entire land (excepting the extreme north, the extreme northeast and extreme south) gets 75% of the annual rainfall. The Gangetic plains of West Bengal 78% of its annual rainfall during the four months period, June to September. During the last seventy five years the dates of onset of monsoon over West Bengal was spread between last week of May to last week of June and those of its withdrawal between last week of September to second week of October.

2.1 RAINFALL PATTERN.

The main channel of Ganga divides West Bengal in two parts which are by and large homogenous from the meteorological point of view. The northern half is designated as Sub-Himalayan West Bengal and the Southern half Gangetic West Bengal. Sub-Himalayan West Bengal is more susceptible heavy rains both in respect of amount as well as in frequency of occurrence. Very heavy rain is more frequent in first two monsoon months (June and July) than in subsequent in Sub-Himalayan West Bengal. In Gangetic West Bengal the frequency is maximum in August followed by June, September and July in that order.

On the basis of rainfall distribution, the State can be sub-divided into two broad Zones.

- 1) The Himalayan and Sub-Himalayan Region.
- 2) The Gangetic Plains.

The Himalayan and Sub-Himalayan regions comprising districts of Darjeeling, Jalpaiguri, Cooch-Bihar and Northern part of Islampur Sub-Division of West Dinajpur District of high incidence of rainfall from 200 cm. to over 400 cm, about 80% of which is found to occur during the monsoon season for June to September. On the average Darjeeling, Cooch-Bihar and Jalpaiguri get 114, 112 and 110 rainy days respectively in a year. The monsoon generally follow a northerly track to ultimately break up against Eastern Himalaya causing very heavy rainfall and thereafter through of low pressure under break monsoon conditions, it shifts northwards to the Himalayan foot hills. It has been found that a precipitation to the tune of 200 to 300 m.m. in 2 hours is not unusual while in more than forty occasions of rainfall of 250 mm and above have been registered during 1891-1965.

The Gangetic plain which constitute the major portion of the State can be further Sub-divided into the following sectors on the basis of average rainfall :-

- SECTOR -I. Comprising the districts of Bankura, Birbhum, Murshidabad and Burdwan which receive an average rainfall between 1140 mm and 1400 m.m.
- SECTOR-II Consisting of the districts of Nadia, Hooghly, Western portion of West Dinajpur, Midnapur and North 24-Parganas having an average annual rainfall between 1400 m.m. and 1650 m.m.
- SECTOR -III Comprising Howrah, Eastern portion of West Dinajpur, South 24-Parganas and Midnapur Districts which register an average annual rainfall between 1650 m.m and 1900 m.m.

Such regional variations in the precipitation pattern causes flood conditions from time to time.

The rainfall data as collected from Indian Meteorological Department for the districts is shown in ANNEXURE-I

3. FLOOD DURING 1992.

3.1. Preamble.

While rainfall in a number of districts of the State of West Bengal were below normal till the end of the Flood season i.e. 15th October, a number of district recorded rainfall above average. Pre-monsoon shower was comparatively less this year resulting in some what drought condition on the eve of monsoon. Southwest monsoon which reaches Gangetic West Bengal by 8th of June was comparatively late this year. It arrived on 18th June but had been vigorous till the end of June thereby surpassing the normal rainfall and making up the deficit. The rivers were ruling high in a number of places. Such high ruling of river accompanied with tidal flow caused some breaches to Rupnarayan Left Embankment at Charkatapukuria in Howrah district.

The North Bengal rivers were also flowing high and warning signals had to be imposed on a number of occasions. One breach resulted to Leesh embankment, a tributary of Teesta.

Widespread rainfall both in the Sub-Himalayan and Gangetic West Bengal occurred during the last week of July. The Cooch Behar town protective and Hanskhowa embankment were threatened.

This rainfall continued till the first week of August in the coastal area of the State, particularly in Midnapore district where rainfall accompanied with Cyclonic storms caused the rivers to rise. Some rivers of the Kaliaghye system crossed the extreme warning stage. This wrought extensive damage to sea wall, illumination systems at Digha and the embankments of the Kaliaghye and Kapaleswari rivers. Incidentally, high tide synchronising this Cyclone caused wave wash along the coastal belt. Wave splashes overtopped Sea wall causing damage to the main ramps.

Towards the northern part of the State, Jalpaiguri town recorded 288mm. of rainfall on 6.8.92. during 24 hours. The low lying areas of the town were water logged. But on the following day, accumulated rain water of the town started receding.

Contd2.....

A significant feature of flood season during this year was causing inundation in Purulia district which is identified as a chronically drought prone district. This occurred during the last week of September. Consequent upon a depression formed in the Bay of Bengal during the third week of September, heavy rainfall was resulted in the coastal areas and in the rest of the southern districts of West Bengal. The system subsequently move in a north westerly direction resulting in heavy rainfall, particularly in the Kangsabati, Kumari, Dwarakeswar subarnarekha and Barakar catchments situated in the district of Purulia. The district headquarters at Purulia town alone recorded a rainfall of 298 mm. during 48 hrs. from 26th to 27th September while Simulia recorded 159 mm. on 26th and 186 mm. on 27th (i.e. a total rainfall of 1431 mm. was already recorded till 28th thereby surpassing annual normal by 161 mm. Though Purulia is identified as a chronically drought

prone district, still such high intensity of rainfall spread over such a short period resulted in flash flood in river Kangsabati in its upper catchment in Purulia district, communication lines, viz. rail and road links were snapped. Inundation resulted and damages occurred to a number of Engineering structures at places. The irrigation structures suffered a lot, the Canals were breached in a number of places. The Kangsabati Reservoir level encroached within the flood storage.

On 14.9.92, a subsidence of about ~~152~~ 152 metres was caused at Basanti Bazar on the bank of river Hegol in South 24 Parganas district. Widespread damage resulted to public including a number of ~~one~~ one storied and two storied buildings. Some of the buildings were already engulfed by the river.

During the first week of October, the right bank of river Bhagirathi at Panchim Mayapur, P.S. Nabadwip, Dist. Nadia eroded for a length of about 500 metres covering a width of 20 metres.

Contd....3....

On 14.9.92, a subsidence of about ~~152~~ 152 metres was caused at Basanti

3.2. FLOOD LEVELS OF WEST BENGAL RIVERS DURING 1992.

Vide Annexures II & III.

3.3. FLOOD SITUATION

4. Districts Darjeeling, Jalpaiguri & Cooch Behar.

The main rivers flowing through this northern part of the State are Mahananda Teesta, Jaldhaka, Torsa, Kaljani, Raidak and Sankosh while the notable important tributaries are Lish, Ghish, Chel, Karala, Murti, Diana, Mijnai, Turturi, Dhowla, Gadadhar, Garam, Dima, Balason, Mechi, Lachka etc. The main problem of all these rivers are viz.

1) Soil erosion, 2) Widening of the river to make up the waterway due to depositing of silt and detritus materials in river bed 3) changing of river course and sometimes avulsion of the main river through the tributaries, 4) bank erosion, 5) spilling over the bank resulting in flooding and sand deposition in agricultural land. All such problems like the previous years were faced during this year also.

In Jalpaiguri district, main damages were caused in Malbazar area, consequent upon heavy precipitation in upper catchments of Sikkim and adjoining areas, flashy rivers like Lish, Ghish and Chel attacked their respective embankments during the low stage of flood resulting in erosion and breach near Bagrakote Army cantonment, Manabari Tea Estate, in between Mech Basti and Kodalkati, Kumalai embankment and spilled Ghish Basti (on the river side) near Oodlabari. A breach on the left embankment of river Leesh occurred for a length of 135 metres on 2.7.92. Damages to spurs also occurred by the river Teesta in low flood condition.

The head quarters of the district, viz. Jalpaiguri town recorded a rainfall of 288 mm. on 6.8.92 during 24 hours. Some of the municipal wards were inundated upto 1 metre height and became waterlogged in some particular areas like Pandapara, Ashok Nagar etc. This was however of very short duration and on the following day, the accumulated rain water of the town started receding.

Though district Cooch-Bihar received rainfall below normal during this year, erosion and inundation of low lying areas took place in this flood prone district. River Torsa was vigorously attacking the Cooch-Bihar Town protective and Hanskhowa Embankment

Contd.....

in a number of places on 24.7.92. Some agricultural lands remained waterlogged for a number of days.

There was no flood in Darjeeling district during this year but a number of existing flood protective works were affected in a number of places.

B.

UPPER DINAJPUR AND DAKSHIN DINAJPUR DISTRICTS.

A number of rivers of these two districts originate in Bangladesh; after flowing through these two districts for certain stretches of length, they re-enter Bangladesh; Rivers like Kulik, Nagar, Chiramati, Tangon, Punarbhaba have their outfalls in river Mahananda either in these two districts or Maldah or in Bangladesh where Mahananda ultimately outfalls into Padma. Atrai however outfalls into Brahmaputra.

The uncontrolled high flood discharge from catchments synchronised with concentrated local rainfall causes flood in the rivers thereby inundating major parts of the districts by spilling. The inundation and flooding in P.S. Hilli is due to spilling of rivers cheri, Ghagra and Jamuna and ingress of flood water from Bangladesh.

This year however, the flood situation was normal and no report of inundation and loss of public utilities has been received.

C. DISTRICT MALDAH.

The district has a topography having scattered low areas with dense population and intensive cultivation. Slight excess rain over average may cause flood here. Spilling from rivers flowing in this district results in tremendous hazards accompanied with drainage congestion.

The main rivers in this district are Ganga, Fulahar, Mahananda, Kalindri and Punarbhaba. The district is bounded by Ganga in the South, Fulahar and Mahananda on the north West and Punarbhaba on the East.

Other rivers like Pagla, Srimati, Tangon etc. traverse only through a small portion in the district. The flood in these rivers synchronised with flood of river Ganga makes the flood situation most intensive in the district. Rainfall in the district was below normal this year and was fairly well distributed and as such no appreciable damage to the Engineering works could be noticed.

D. DISTRICT MURSHIDABAD.

The main rivers in the District are Mayurakshi, Dwarka, Brahmani, Bhairab, Jallangi, Bansloi, all outfalling into the river Bhagirathi which is the main drainage artery in the District. So, when the river Bhagirathi runs high, flood situation is experienced in the Basins of its tributaries. Hence, a vast tract of land in the district of Murshidabad under P.S. Mandi, Berhampore, Bharatpur, Khargram, ~~Barwan~~ Barwan and Beldanga are subject to inundation. On the other hand, due to high ruling of river Ganga a substantial area in P.S. Farakka, Samserganj, Suti, Raghunathganj, Bhawangolla, Raninagar and Lalgola are inundated causing serious hardship to the people. But this year, no abnormal rainfall occurred in the river catchments and consequently the flood situation in the District as a whole was normal, but still then some flood embankment in Kandi, Bharatpur and Berhampore P.S. were damaged and some active erosion was noticed at Sekhalipur, Akheriganj areas.

E. DISTRICT NADIA.

The Topography of the District has some scattered low line area with thick population and intensive cultivation. So a slight excess rainfall beyond the average may cause flood here. Spilling from the ~~river~~ rivers like Jallangi, Churni and Bhagirathi results in flood hazards associated with drainage congestion. But this year the rainfall in the district was lower than that of normal average rainfall and obviously there had been no cases of submergence of areas and subsequent drainage congestion. But due to normal flood condition in the river Bhagirathi, this year, erosion of Bank of different places i.e., Mayapur, Prachin Mayapur, Juranpur, Abhoynagar had taken place.

The right bank of River Bhagirathi at Prachin Mayapur P.S. Nabadwip District Nadia eroded for a length of about 500M. Covering about 20M. Width during the first week of October 1992. Due to this erosion three Pucca buildings (one of which is a primary school Building) have been damaged.

F. DISTRICT MIDNAPUR E.

The main rivers in this district are Rupnarayan, being the combined flow of Cossye and Silabati till they meet at Bandar, Haldi, being the combined flow of New Cossye and Kaliaghye till they meet at Moyna. Kaliaghye is the combined flow of three main streams viz. Kapaleswari, Chandia and Baghai. The main problem of flood in this district is caused due to acute drainage Contestion which in turn is aggravated due to prevailing high tides and damage towards embankment s.

During the last week of July viz. from 29.7.92, consequent upon heavy rainfall synchronised with cyclonic storm over the coastal areas of the district, the rivers particularly those under the Kaliaghye system were rising and some rivers viz. Kaliaghye, Chandia, Kapaleswari were flowing above their Extreme Danger Level marks. This continued till 4.8.1992, illumination system at Digha and the embankment of the Kaliaghye and Kapaleswari rivers, Incidentally, the high tide synchronising this cyclone caused wave wash along the coastal belt. Wave splashes overtopped sea wall causing damage to main ramps. ~~300~~ slips towards embankments occurred to 1) Kapaleswari left embankment (250M), 2) Kapaleswari right (200M), 3) Kaliaghye left (30M), 4) Chandia left embankment (30 M.) and subsidence for a length of 45 M. to Kaliaghye left embankment.

Bank protective works on the right bank of river Rupnarayan at Kalaghat was damaged during Kotal period (perigeon tides) from 9.9.92 to 11.9.92.

G. HOOGLHY AND HOWRAH DISTRICTS.

Monsoon had been vigorous in the southern part of the State during the last week of June. Due to high ruling of river accompanied with tidal flow some breaches occurred to Rupnarayan Left Embankment at Charkatapukuria in Howrah district. Two breaches occurred at Jhumjhum. On Hooghly Right Embankment, a portion near Sundarimohan sluice was damaged due to passage of this flood.

During the second week of August, heavy local rainfall caused some inundation in P.S. Khanakul, Arambag and Goghat in Hooghly district. Some damages were caused to some embankment in some places of river Dwarakeswar.

H. BURDWAN DISTRICT.

The main rivers in this district are Damodar, Ajay and Bhagirathi. There was no flood in the river Damodar during 1992 but moderate flood passed down the river Bhagirathi and Ajay. Some bank erosion were caused on the bank of river Ajay at Kurgram, Bilsonda and Harinathpur. The bank protection work at Dainhat slipped down for a length of about 100 metres while the bank protective work at Baladanga was partly damaged. Erosion occurred at Nutanhat on the right bank of river Bhagirathi at Uddharanpur in P.S. Katwa, Some damages were also caused to some irrigation structures, and some breaches occurred to Damodar Branch Canal and Panagarh Branch Canal. Due to some flood release from Durgapur Barrage on 27.9.92, some erosion resulted on the left bank of river Damodar, Babupuradhal, Dadpur and Habashpur area.

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I. SOUTH 24 PARGANAS DISTRICT.

A subsidence of about 152 metres was caused at Basanti Bazar on the bank of river Hogal on 14.9.92. Widespread damage was caused to public utilities including a number of one storied and two storied buildings. Some of the buildings were engulfed by the river.

J. PURULIA DISTRICT.

A remarkable feature was observed during the flood season of 1992 when flooding resulted in Purulia district thereby causing damage to Engineering structures and public utilities. Purulia is identified as a chronically drought prone district, where average annual rainfall is 1363 mm. while the Purulia town average annual normal is only 1270 mm. The intensity of rainfall has also not been found so high to result any flood as found from records. The people of Purulia has practically no experience of flood. Inundation during this year has caused this district to find a place in the flood map of the State.

The weather forecast as received from the India Meteorological Department on 24.9.92, reads as such:

" A low pressure area formed over North Bay in the morning of 24.9.92. Which moved in a westerly direction and lay over North Orissa adjoining Gangetic West Bengal and North West Bay in the evening of 25.9.92. The system then moved in a north-westerly direction and in the morning of 26.9.92 was lying over North Orissa adjoining Gangetic West Bengal and Bihar plateau on 27.9.92, it was lying over Bihar plateau and Gangetic West Bengal., Under its influence, rainfall occurred at most places with heavy to very heavy falls at a few places in Purulia district on 26.9.92."

Consequent upon this depression, heavy precipitation occurred particularly in the Kangsabati, Kumari, Dwarakeswar, Subarnarekha and Barakar catchments situated in Purulia district. The district headquarters at Purulia town alone recorded a rainfall of 298mm. during the 48 hrs. from

Contd...17..

A total rainfall of 1431 mm. was already recorded

26th to 27th September while Simulia recorded 159mm. on 26th and 186 mm. on 27th (i.e. a total of 345 mm. during 48 hours). A total rain fall of 1431 mm. was already recorded till 28.9.92, thereby surpassing annual normal by 161 mm.

Rainfalls recorded at different stations during 25.9.92, and 26.6.92 are furnished below. Apart from this, from local enquiry, it revealed that heavy rainfall started at about 5 P.M. of 25.9.92 and continued till the midnight 26.9.92. The intensity of rainfall was heavy.

From the above table, it may clearly be concluded that rainfall was widespread in the southern part of West Bengal including the districts of Purulia, Bankura, Burdwan in West Bengal and Singhbhum, Ranchi and Hazaribagh in Bihar.

This high intensity of rainfall spread over such a short period resulted in flash flood in river Kangsabati in its upper catchment in Purulia district, communication lines, viz. rail and road links were snapped. Inundation resulted and damages occurred to a number of Engineering structures at places. The irrigation structures suffered a lot the Canals were breached in a number of places. Damages were also caused to houses and public utilities. Spillway discharges as well as discharges over the weirs of medium and minor irrigation schemes particularly in Kangsabati, Kumari and Subarnarekha catchments were much above design discharge. Water level recorded in some of the dams and weirs in Kangsabati, Kumari and Subarnarekha catchments are as follow:-

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Rainfall in details

<u>Station</u>	<u>Managed by</u>	<u>26-9-92</u>	<u>27-9-92</u>	<u>T o t a l</u>
Parga	I&W.D.ptt.	240 mm	240 mm	480 mm
Jhalda	-do-	90	452	542
Purulia	-do-	130	157.6	287.60
Saharajore	-do-	118.37	415.68	434.05
Bagmundi	-do-	84.00	305.00	389.00
Kumari	-do-	96.00	284.00	380.00
Bandhu	-do-	108.00	305.00 (upto 2 P.M.)	Could not be measured due to flooding.
Arsha	CWC	172.40	520.40	692.80
Berabhum	I&W.Deptt.	75.00	326.00	401.00
Hanumata	-do-	150.00	370.00	520.00
Beko	-do-	26.00	180.00	206.00
Ramchandrapur	-do-	45.00	45.00	90.00
Lipania	-do-	26.80	250.50	277.30
Dangra	-do-	65.00	132.00	197.00
Majra	-do-	65.00	91.00	156.00
Taragonia	-do-	35.00	245.00	280.00
Bandajore	-do-	152.45	153.28	305.73
Rupai	-do-	46.00	342.00	388.00
Dimu	-do-	70.00	200.00	270.00
Karior	-do-	30.00	160.00	190.00

Rainfall recorded by other Department (collected from IMD) are as follows :-

<u>District</u>	<u>Station</u>	<u>24-9</u>	<u>25-9</u>	<u>26-9</u>	<u>27-9</u>	<u>28-9</u>	<u>Total</u>
Purulia	Hatwara			112.00	153.60	3.60	269.20
	Jhalda			90.00	250.00		340.00
	Khariwar			97.20	2.00	8.40	107.60
	Kashipur			80.00	78.00	6.00	164.00
	Purulia			134.00	164.00	3.40	301.40
	Simulia			159.20	186.20	0.00	345.40
	Tusuma			131.20	19.00	8.00	158.20
Bankura	Kangsabati Dam		12.80	99.60	2.60		115.00
	Ranibach		19.60	54.60	12.40		86.60
	Jeypore		28.60	41.40	4.00		74.00
	Indus		39.00	N.A.	N.A.		--
Midnapore	Contai	1.30	63.00	32.00	29.40		125.70
	Digha	5.70	60.90	34.00	14.70		115.30
	Durgachak	16.60	45.20	19.80	120.30	1.00	209.70
	Jhargram		8.80	29.20	14.20		52.20
	Kesiary		26.80	15.80	182.60	14.40	239.60
	Midnapore		17.00	4.80	23.40	--	45.20

Name of Dam.	Crest level of spillway Weir	Top level of dam.	Levels in Metre	
			Full tank level	Actual level attained during flood.
Saharajore	326.44	329.67	328.15	328.73
Bandhu weir	Water level rise 2.15 metres above top level of afflux bundh.			
Bandhu dam (under construction) Top level	315.46	318.52		313.94
Kumari	233.07	238.96	235.61	238.05
Barabhum	220.37	227.38	225.86	
Kestobazar	255.42	261.52	259.08	260.30

The above chart clearly indicates that the discharge capacity of the spillway or the weirs are less than the actual discharges of the rivers or tributaries for this particular storm. In fact, the flood waters were stored in Saharajore, Bandhu, Kumari and Kestobazar dams resulting in moderation of flood in the down stream, otherwise in absence of these dams the flood intensity would have been more than experienced by the people during this flood. The rainfall isohyets were drawn for the rainfall during the period from 25.9.92 to 26.9.92 for representing the actual rainfall intensity in Purulia district. This rainfall intensity as well as the quantum of rainfall in one storm is unprecedented of all the available records of rainfall of previous years of the district.

The total inflow to the Kangsabati dam was 28,762 Ha. Metres from this storm run-off; the catchment area of Kangsabati river upto the dam the catchment comes to 150mm. The inflow into the Kangsabati dam during 26.9.92 and 27.9.92 (recorded on 27.9. and 28.9) was 53,924 Ha. Metres From analysis of rainfall, it has been noticed that the intensity of rainfall was very high in Haldah, Area, Bamundi, Balarampur, Purulia and Jaipur blocks- The country slope is comparatively steeper in this area, the time of contraction being less, the flood water rushed through the rivers flooding the adjoining areas and damagina

Contd....19....

damaging the public utilise services and properties during such short duration of flood. In absence of any dam over river Kangsabati at M.,kutmonipur flood damages in the districts of Bankura and Midnapore with a discharge exceeding 4250 cumecs (about 1,50,000 cusecs) could not be ruled out and flood damages could have been monumental in these areas.

A number of Engineering structures were seriously affected in P^U Purulia district due to the spell of this flood. The Saharajore dam, having an irrigable area of more than 5000 hectares was seriously threatened when the stored water in the dam was above full tank level, seepage was observed in the downstream portion of the dam. The stored water encroached within the designed free board to the extend of 0.90 metre. The flexible apron of spillway of the Kestobazar dam was severely damaged and similar type of damage was also observed in case of Kumari dam and Bandhu weir. The afflux bundh of Bandhu weir breached as water level was about 2 metres above the top level of afflux bundh.

Widespred damages were also caused to number of canals, cross drainage works, inlets, outlets etc of different medium and minor irrigation schemes located in different parts of the district.

On the whole, no major damages of any of the dam or weir or the structures itself occured during this flood. Moreover, the floods were moderated due to conservation of flood water in Saharajore dam and Bandhu dam being under construction within the Kangsabati catchment Both Kumari and Barabhum dams within the Kumari catchment have also reduced flood intensity in K^U mari river due to detention of flood water within these two dams. All the spillways and weirs of the medium and minor irrigation schemes within Purulia district were designed for a run-off of 25mm. per hour while the peak run-off during this storm ~~exceeded~~ exceeded this limit. This excess quantum of water was stored in different dams and the portion of the free board was encroached giving some benefits of flood moderation.

ANNEXURE - I.

xx RAINFALL IN MM.

RAINFALL DATA IN THE DISTRICT OF WEST BENGAL DURING 1992

Name of the District.	<u>From 1.1.92 to 31.5.92</u>		<u>From 1.6.92 to 14.10.92</u>		<u>From 1.1.92 to 14.10.92</u>		Total Annual Normal	Percentage departure on 14.10.92.
	Normal	Actual	Normal	Actual	Normal	Actual		
Cooch-Behar	636	392	2876	1975	3512	2367	3608	-32.60
Jalpaiguri	471	220	2761	2331	3232	2551	3339	-21.07
Darjeeling	337	212	2371	2362	2708	2574	2832	- 4.95
Malda	186	141	1161	1070	1347	1211	1453	-10.10
West Dinajpur	216	91	1162	1128	1378	1219	1972	-11.54
Murshidabad	211	58	1115	1000	1326	1058	1417	-20.11
Birbhum	163	125	914	934	1077	1059	1289	-1.67
Nadia	268	148	1104	807	1372	955	1474	-30.39
Burdwan	203	202	1105	939	1308	1141	1496	-12.77
Bankura	178	218	1062	1321	1240	1539	1422	+24.11
Purulia	115	183	1114	1217	1229	1400	1249	+14.00
Midnapore	219	214	1211	1266	1430	1480	1593	+ 3.50
Hooghly	183	78	1268	850	1451	928	1523	-36.04
Howrah	283	150	1296	910	1579	1060	1525	-32.87
24-Parganas(S)	233	256	1371	1428	1604	1684	1544	+ 4.99
24-Parganas(N)	183	326	1268	1167	1451	1493	1693	+ 2.89

Source : India Meteorological Department,
Alipore, Calcutta-700 027.

A N N E X U R E - II

FLOOD LEVELS OF WEST BENGAL RIVERS DURING 1 9 9 2
(NORTH BENGAL RIVERS)

Name of River.	Gauge at	District.	Yellow Signal		Red Signal		Date	Time	Water Level above Y.S & R.S in M.	Remarks
			Unprotected area	Protected area	Unprotected area	Protected area.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Teesta	Damohani	Jalpaiguri	85.30M	85.60M	85.60M	86.30M	25.6.92	10.00	85.40	Y.S.for U.A.
							28.6.92	10.00	85.18	Y.S.withdrawn
							29.6.92	11.15	85.14	Y.S.imposed at 18-30 Hours.
							2.7.92	10.00	85.42	Y.S.withdrawn
							3.7.92	10.30	85.19	Y.S.for U.A.
							7.7.92	10.00	85.58	Y.S.withdrawn
										Y.S.for U.A.

Y.S. - Yellow Signal
R.S. - Red Signal
U.A. - Unprotected Area.
P.A. - Protected A-rea
H.W.L. - Highest Water Level
D.L. - Danger Level
E.D.L. - Extreme Danger Level.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
							8. 7. 92	10.00	85.30	Y.S. withdrawn at 10-30 Hours
							14. 7. 92	10.00	85.62	Y.S. for P.A.
							15. 7. 92	10.00	85.73	Y.S. continuing
							16. 7. 92	10.00	85.49	Y.S. continuing
							17. 7. 92	10.00	85.52	-Do-
							18. 7. 92	10.00	85.49	Y.S. for P.A. withdrawn. Y.S. for U.A. continuing
							19. 7. 92	10.00	85.67	Y.S. for P.A. imposed.
							20. 7. 92	10.00	85.57	Y.S. continuing.
							21. 7. 92	10.00	85.57	-do-
							22. 7. 92	10.00	85.57	-do-
							23. 7. 92	10.00	85.52	Y.S. for P.A. withdrawn. Y.S. for U.A. continuing

Name of River.	Gauge at	District.	Yellow Signal		Red Signal		Date.	Time.	Water Level above Y.S. & R.S. in M	Remarks
			Unprotected area	Protected area	Unprotec ted area	Pro- tected area				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
XXXXXX							24.7.92	10.00	85.53	Y.S. for U.A.
							26.7.92	10.00	85.54	Y.s for U.A.
							27.7.92	10.00	85.66	Y.S. for P.A.
							28. 7. 92	10.00	85.59	Y.S. for U.A.
							29.7.92	10.00	85.48	-do-
							30.7.92	10. 00	85.58	-do-
							31.7.92	10.00	85.54	-do-
							1.8.92	10.00	85.50	-do-
							2.8.92	10.00	85.64	Y.S. for P.A.
							3.8.92	10.00	85.68	-do-
							4.8.92	10.00	85.64	-do-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
							5.8. 92	10.00	85.64	Y.S.for P.A.
							6.8. 92	10.00	85.68	-do-
							7.8. 92	10.00	85.71	-do-
							8. 8.92	10.00	85.60	-do-
							9. 8. 92	10.00	85.58	Y.S.for U.A.
							10. 8. 92	10.00	85.45	-do-
							11. 8. 92	10.00	85.40	-do-
							12. 8. 92	10.00	85.34	-do-
							16. 8. 92	10.00	85.38	-do-
							17. 8. 92	10.00	85.42	-do-
							18. 8. 92	10.00	85.50	-do-
							19. 8. 92	10.00	85.44	-do-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
							20.8.92	10.00	85.40	Y.S. for U.A.
							21.8.92	10.00	85.45	-do-
							22.8.92	10.00	85.51	-do-
							23.8.92	10.00	85.59	-do-
							24.8.92	10.00	85.47	-do-
							25. 8.92	10.00	85.56	-do-
							26.8.92	10.00	85.67	Y.S. for P.A.
							27.8.92	10.00	85.35	Y.S. for U.A.
							28.8.92	10.00	85.50	-do-
							29.8.92	10.00	85.37	Y.S. for U.A.
							31.8.92	10.00	85.35	-do-
							12.9.92	10.00	85.54	-do-

1	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
							14.9.92	10.00	85.33	Y.S. for
							15.9.92	10.00	85.38	-do-
							16.9.92	10.00	85.50	-do-
							17.9.92	10.00	85.61	Y.S. for
Jaldhaka	N.H.31-Xing	-do-	80.00	80.10	80.50	80.90	4.9.92	10.00	79.94	Seasons
Raidak-I	L.R.P.-Xing	Cooch- Behar	46.70	47.00	47.60	47.90	7.8.92	10.00	45.80	-do-
Raidak-II	L.R.P.-Xing	-do-	48.10	48.40	49.00	49.30	14.9.92	10.00	46.40	-do-
Sankosh	L.R.P.-Xing	-do-	48.20	48.50	49.10	49.40	28.7.92	10.00	47.00	-do-
Mansai	Mathabhanga	-do-	48.20	48.40	48.70	48.90	18.7.92	10.00	48.25	Y.S. for
Kalani	Alipurduar	Jalpai- guri	45.10	48.20	45.70	48.70	16.7.92	10.00	43.92	Season's
Diana	Chengmari	-do-	200.50	200.50	201.40	201.40	13.7.92	10.00	199.00	-do-
Torsa	Hasimara		116.30		116.90	117.50	7.7.92	10.00	115.98	-do-

(1)	(2)	(3)	(4) D.L.	(5) E.D.L.	(6) Date.	(7) Time	(8) Water Level	(9) R e
Mahananda	Siliguri	Darjeeling	115.275	116.59	26.8.92	6.00	115.30	Season's
Ganga	Farakka	Murshidabad	22.25	23.77	27.8.92	6.00	22.28	Above D.
					28.8.92	6.00	22.72	-do-
					29.8.92	6.00	22.88	-do-
					30.8.92	6.00	22.91	-do-
					31.8.92	6.00	23.04	-do-
					2.9.92	6.00	23.04	-do-

Name of River	Gauge at	District	Danger Level	Extreme Danger Level	Date.	Time	Water Level	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ganga	Farakka	Murshidabad			3.9.92	6.00	22.905	Above D.L.
					16.9.92	6.00	22.48	-do-
					17.9.82	6.00	22.92	-do-
					19.9.92	6.00	23.37	-do-
					20.9.92	6.00	23.48	-do-
					21.9.92	6.00	22.74	-do-
					22.9.92	6.00	23.32	-do-
					23.9.92	6.00	22.74	-do-
Punarbhaba	Gangarampur	West Dinajpur	25.82M	26.42M	30.9.92	12.00	25.80	Season's H.W.L.
Atrai	Balurghat		23.15M	23.76M	9.8.92	6.00	22.74	-do-
Tangon	Banshihari		25.60M	26.21M	17.7.92	6.00	25.83	Above D.L.
					18.7.92	6.00	25.91	-do-
					30.9.92	6.00	25.85	-do-
Fulahar	Teljana	Malda	90.00ft.	93.00	20.9.92	6.00	88.10	Season's H.W.L.
Ganga	Manickchak	Malda	25.30M	25.30M	21.9.92	6.00	25.02	-do-

ANNEXURE - III

FLOOD LEVELS OF RIVERS OF WEST BENGAL DURING 1992
(SOUTH BENGAL RIVERS)

ANNEXURE - III

FLOOD LEVELS OF RIVERS OF WEST BENGAL DURING
(SOUTH BENGAL RIVERS)

Name of River	Gauge at	District	Danger Level	Extreme Danger Level	Date.	Danger Time	Flood Level above D.L. & E. D. L.	Remarks
1.	2.	3.	4.	5.	6.	7.	8.	9.
Ganga	Nurpur	Murshidabad	21.03M	21.64M	29.8.92	6.00	21.08	Above D.L.
					30.8.92	6.00	21.18	-do-
					1.9.92	6.00	21.31	-do-
					2.9.92	6.00	21.22	-do-
					3.9.92	6.00	21.10	-do-
					21.9.92	6.00	21.68	-do-
Ganga	Giriya	-do-	20.57M	21.18M	22.9.92	6.00	21.58	-do-
					21.9.92	6.00	20.94	-do-
					22.9.92	6.00	20.82	-do-
Bhairab	Akheriganj	-do-	18.44M	19.05M	21.9.92	6.00	18.21	Season's H.W.L
Jalangi	Swarupganj	Nadia	8.44M	9.05M	30.9.92	6.00	7.59	-do-
Churni	Hanskhali	-do-	7.53M	8.14M	2.9.92	6.00	5.88	-do-
Dwarka	Sankoghat	Birbhum	20.40M	21.30M	9.8.92	9.00	20.30	-do-
Mundeswari	Harinkhola	Hooghly	40.00ft.	42.00ft.	8.8.92	9.30	35.05	-do-
Kalaighaye	Dehati	Midnapore	7.00M		28.7.92	12.00	7.45	Above D.L.
					30.7.92	18.00	7.40	
					31.7.92	6.00	7.22	

1.	2.	3.	4.	5.	6.	7.	8.	9.
Kapaleswari	Narayanbar	Midnapore	5.33M	5.94M	30.7.91	12.00	6.10	Above E.D.L.
					31.7.91	12.00	6.09	-do-
					1.8.91	12.00	5.93	Above D.L.
					3.8.92	6.00	5.66	-do-
					5.8.92	6.00	5.58	-do-
					6.8.92	6.00	5.40	-do-
					7.8.92	6.00	5.36	-do-
					10.8.92	6.00	5.36	-do-
Chandia	Barisa	-do-	4.57M	5.03M	30.7.92	6.00	4.66	Above D.L.

ANNEXURE -IV.

Area flooded in different districts of
West Bengal during 1992

<u>Name of districts.</u>	<u>Geographical area in Sq. Km.</u>	<u>Area flooded in Sq. Km.</u>
1. Coochbehar	3386	11.00
2. Jalpaiguri	6245	1.25
3. Darjeeling	3075	NIL
4. Uttar & Dakshin Dinajpur	5206	41.76
5. Maldah	3713	2.75
6. Murshidabad	5341	113.96
7. Nadia	3926	146
8. Burdwan	7028	NIL
9. Birbhum	4545	NIL
10. Howrah	1467	NIL
11. 24 Parganas (North) & 24 Parganas (South)	13796	NIL
12. Purulia	6259	64.53
13. Bankura	6881	NIL
14. Hooghly	3145	70.47
15. Midnapore	13724	NIL
16. Calcutta	116	NIL
	<hr/>	<hr/>
	87,853	450.47
	<hr/>	<hr/>

ANNEXURE - V.

Flood Release from Reservoirs.

A. Kangsabati

<u>Date of Release</u>	<u>Time (Hrs.)</u>	<u>Discharge in Cumecs.</u>
27.9.92	12.00 to 15.00	233.2
	15.00 to 18.00	566.4
	18.00 to 24.00	849.6
28.9.92	0.00 to 4.00	849.6
	4.00 to 24.00	283.2
29.9.92	0.00 to 6.00	283.2
	10.00 to 15.00	84.96

D.V.C.

28.9.92	9.00	883
	12.00	992

A N N E X U R E - V I .

General Abstract of estimated cost of Flood Damage
Repairs and Restoration Works.

Sl.No.	Name of District.	Estimated cost Repairs/ Restoration works (Rs.in lakhs)
<hr/>		
1.	Darjeeling	28.13
2.	Jalraiguri	111.00
3.	Cooch-Behar	131.00
4.	Midnapore	21.00
5.	Hooghly	28.00
6.	Howrah	4.50
7.	Purulia	416.00
8.	Nadia	48.00
9.	Murshidabad	369.00
10.	Maldah	57.00
11.	Uttar & Dakshin Dinajpur	58.00
<hr/>		
TOTAL FOR WEST BENGAL		1271.63
<hr/>		

A N N E X U R E - VI-A

List of flood damages during 1992 in Darjeeling District.

1. <u>Sausage Apron :-</u>	At the existing Trihans Embnkt. Apron damaged for 45 Mt. length.	Rs. 50,000/-
	Nayabasty. Apron damaged. for 200 Mtr.	<u>Rs. 1,00,000/-</u>
2. <u>Sausage & Bed Bar.</u>	Anti-erosional Scheme at Lalsara. and bhamal jote. Apron of Length 100 M & 3 nos. bed bars damaged.	<u>Rs. 1,00,000/-</u>
3. <u>Sausage Apron</u>	Avalsion of River Mahananda into River Nagradoba & Mahimari. Apron damaged about 100 Mt. Length.	Rs. 1,00,000/-
	Apron damaged for 75 Mt. length.	<u>Rs. 75,000/-</u>
		Rs. 1,75,000/-
4. <u>Boulder sausage wall apron.</u>	Protection of the left bank of river Chenga from erosion at Ambarihat Erosion.	Rs. 30,000/-
5. <u>Boulder Sausage wall Apron.</u>	Protection on the Left Bank of River Machi at Panitanki at Ch. 450 to 550 M. Erosion.	Rs. 25,000/-
6. <u>Earthen canal slope & outlay pipe.</u>	Taipu(I) Scheme Erosion.	Rs. 25,000/-
7. <u>Boulder sausage wall apron.</u>	Protection on the Left Bank of River Boon at Paharvita. Erosion.	Rs. 30,000/-
8. <u>Bank protective works (D/S) Toe sausage at Dadabhai Colony (Reach-I)</u>	2 nos. bedbars damaged. Erosion.	Rs. 20,000/-
	3 Nos. sausage bedbars damaged.	Rs. 30,000/-
	2 Nos. bedbars, 100 Mt. Length apron damaged	<u>Rs. 85,000/-</u>
9. <u>Protection on the Left Bank of river Palason at Patiram protection bed bars at Lalsara & Dhamal jote.</u>	200 M. apron damaged.	Rs. 1,00,000/-
	250 M. apron, 3 Nos. bed bars damaged.	Rs. 1,00,000/-
<u>Flood Protective embankment at Fulbari Pattan.</u>	30 M length of River Balason at Dhumriguri	Rs. 50,000/-
	100M apron 4 Nos. bed bars damaged.	Rs. 8,00,000/-
	100M apron of R. Balason damaged.	Rs. 80,000/-
	300M apron damaged.	Rs. 1,50,000/-
	Protection on the Left Bank of River Balason D/S. of N.H-31.	
	250 Mt. slope pitching & apron damaged.	Rs. 1,50,000/-

10.	A/R to Siliguri Town Protective Works.	20 Mt. Sausage work and apron damaged.	Rs. 15,000/-
11.	Protection of the Right Bank of river Mahananda at a) Thumba Patiram.	2 no. bed bars & 50 Mt. sausage wall damaged.	Rs. 75,000/-
	b) Protection on the Left Bank of River Mahananda at Parashnagar and Dasharathpally at Natumpara.	20 M sausage wall & apron damaged.	Rs. 18,000/-
		150 Mt. sausage apron. 5 M bed bars damaged.	Rs. 2,00,000/-
12.	Bed bars at Taribaril, Botgara, Sishubaril etc. on R. Mahananda sausage bed bars apron damaged.	---	----
13.	Nchaljote Protective works on river Mechi.	Bed bar 6 Nos. & 25 wall damaged.	Rs. 80,000/-
14.	Anti-erosion Protection on both banks of river Panchanai at Patialony and Pury House.	5 Nos Bed bars & 150 Mt. apron damaged.	Rs. 1,25,000/-
15.	Protection of the Right Bank of river Mahananda at Parashnagar and Natumpara.	40 Mt. sausage wall and apron.	Rs. 50,000/-
15.	Anti-erosion Protection on the Left Bank of river Mechi at Decpnagar.	100 Mt. sausage apron damaged.	Rs. 1,00,000/-
16.	Protection on the Right Bank of river Hulia at Sree Colony.	3 No. bed bars damaged.	Rs. 50,000/-
			<u>Rs. 28,13,000/-</u>

ANNEXURE - VI B
LIST OF DAMAGES DURING FLOOD SEASONS 1992.
IN JAIPAIGURI DISTRICT

ANNEXURE - VII
 LIST OF DAMAGES DURING
 IN JAIPAIGURI DISTRICT

Sl. No.	Name of Embankment/Bank Protection/Spur affected	Type of damage	Approximate Cost of
1.	Protection of L/B of River Leesh at the U/S of Rly bridge near Begrakota P.S. Mal, Dist. Jalpaiguri.	L/Breached length 115 M.	8.6 Lakhs
2.	Protection of L/B of River Gheesh at upstream of Rly. Bridge at Manabari P.S. Mal, Dist. Jalpaiguri.	L/Breached length 300 M.	14.00 Lakhs
3.	Protection of L/B of River Gheesh at d/s of NI-31 bridge near Gheesh Basti	Washing out of boulder/sausage embankment	3 Lakhs
4.	Protection avulation to R/Chal into River Kumlai	Embankment -90 M	16.5 Lakhs
5.	Protection of R/B of River Chal from Mechbasti to Kodalkati	Embankment (300 M)	3.5 Lacs.
<u>S P E R S</u>			
6.	Spur No. 1 at Sidhabari Changmari Embankment of River Teesta Embankment.	L/B of nose and u/s shank	14.00 Lakhs
7.	Spur at 3710 of J.T. P. Embankment on L/B of River Teesta	of nose and D/S shank	12.00 Lakhs
8.	Spur No. 1 of Teesta Karals Seggragating embankment		1.00 Lakh
9.	Spur at ch. 2075 M of New Changmari Pranganj embankment	Apron	1.00 Lakh

Contd....2...

10.	Chengmari embkt. on Diana River	3.50	lakhs.
11.	Bamandanga armoured embkt. on river	1.00	lakhs.
12.	Hemaguri Bull headed spur & Kalakucha embkt. on river Raidak-II	1.00	lakhs.
13.	Dambāri-Patkidah & Khairbari Salbullah screen on river Jaldhaka.	4.80	lakhs.
14.	Kalabari embankment on river Diana	0.50	lakh.
15.	Jaldapara embankment	2.50	lakh\$.
16.	Takālla embankment on river Sankosh	2.14	lakhs.
17.	Bamandanga Marginal embankment & spur on river Jaldhaka.	12.10	lakhs
18.	Salbullah screen at Fataktari on river Jaldhaka.	2.20	lakhs.
19.	Purba Chakchaka embkt. on river Raidak-II	1.10	lakh.
20.	Bandapani Scheme on river	0.75	lakh.
21.	Jateswar Irrigation Scheme	0.75	lakhs
22.	N.K. Irrigation Scheme	0.04	lakh
23.	Samuktaka embankment on river Dharsi	0.05	lakh.
24.	Paschim Khalisamari embankment on river Dharsi.	0.32	lakh.
25.	Karipara Bindipara embankment on river Gadadhar.	0.15	lakh.
26.	Purba Salbari embankment on river Sonkosh	0.25	lakh
27.	Palliative work on river Sankosh	0.66	lakh
28.	Balasunder embankment on river Dudua	0.75	lakh
29.	Pagli Bhutan embkt. on river Pagli	1.60	lakh
30.	Jorai Irrigation Scheme	0.30	lakh.
31.	Dalsinghpara embankment river Torsa	0.30	lakh.
32.	Silbarighat Salbullah Screen on river Torsa.	0.30	lakh.
33.	Extension of Deodanga embankment on river Torsa.	0.30	lakh.
34.	Mendabari embankment on river Kaljani.	0.04	lakh.
	Total	111.00	lakhs.

for Executive Engineer,
Alipurduar Irrigation Division
Alipurduar, Jalpaiguri.

ANNEXURE - VIC
LIST OF DAMAGES DURING FLOOD SEASON OF 1992
IN COOCH - BEHAR DISTRICT

<u>Name of engg. works</u> 1.	<u>Type of work.</u> 2.	<u>Approx. cost of damage.</u> 3.	<u>Disruption of Com. if any.</u> 4.
1. Souldhukri, Nota- fela on r/b. of river Kaljani.	Bank protective	Rs. 7.00 lakhs.	Approach road engulfed in river.
2. Dakhin Pundibari on r/b. of river Kaljani.	0	Rs. 4.00 "	nil
3. Aludhowa on r/b. of river Kaljani.	"	Rs. 5.00 "	"
4. Panisala r/b. of river Torsa.	Permiable spur.	Rs. 4.00 "	"
5. Dawaggni on l/b. of river Torsa.	Solid spur.	Rs. 4.00 "	Approach rd. damaged.
6. Kaljani scheme on r/b. of river Kaljani.	Spur & embkt.	Rs. 4.00 "	Nil
7. Falimari scheme on l/b. of river Torsa.	"	Rs. 4.00 "	Approach rd. damaged.
8. East Fulbari on r/b. of river Dudua.	Embankment.	Rs. 5.00 *	Nil
9. Httar Daibhangi on r/b. of river Jaldhaka.	Scheme & bed bars.	Rs. 8.00 "	"
10. Mathabhanga T.P. Work.	Embankment.	Rs. 5.00 "	"
11. Bhagdabari spur on r/b. of river Mansai.	Spur.	Rs. 5.00 "	"
12. Sagardighi r/b. of Jaldhaka.	"	Rs. 5.00 "	"
13. Bhangamore & Sildanga on r/b. of river Torsa Mansai.	Spur.	Rs. 8.00 lakhs.	Nil.
14. Palpara on r/b. of river Torsa.	Permanent spur.	Rs. 5.00 "	Highway is very near to eroded bank of river.

Contd.....2....

15.	Atharokota.	Embkt. & permanent spur.	Rs. 10.00 lakhs.	Approach road engulfed.
16.	Hanskhowa.	Embkt. & solid spur	Rs. 7.00 "	Nil
17.	Coochbehar T.P.	Embankment.	Rs. 5.00 "	"
18.	Bairati Jagatjully.	"	Rs. 4.00 "	"
19.	Malerjhar.	Embkt. & spur.	Rs. 4.00 "	"
20.	Gadadhar.	Embkt.	Rs. 5.00 "	"
21.	Belapeta.	"	Rs. 5.00 "	"
22.	Balabhut.	"	Rs. 5.00 "	"
23.	Tufanganj C.P.	"	Rs. 5.00 "	"
24.	Tufanganj Tap.	"	Rs. 3.00 "	"
25.	Arampur on r/b. or Kaljani.	Solid spur & embkt.	Rs. 5.00 "	
Total:-			<hr/>	Rs. 131 lakhs.

ANNEXURE - VID

LIST OF DAMAGES DURING FLOOD SEASON OF 1992
IN MIDNAPORE DISTRICT.

Description

approx.
Cost of Repair
in Rs. Lakhs.

Mapaleswari Left & Right Embankment
at Lokepit, Kamarpota Narayanbar
Badly damaged due to heavy rainfall
and Cyclonic Weather.

Rs. 21 Lakhs.

Kalaighai Left & Right embankment
damaged at many places due to heavy
rainfall on 27.7.92. Due to high wave
splash on 30.7.92 sea-wall and pavement
damaged at digha.

approx.
Cost of Repair
in Rs. Lakhs.

Rupnarayan Right embankment have
also been damaged serious. damages
occured at boulder pitching work at
Kolaghat, due to thrust of high Kotal
on 9.9.92 to 11.9.92.
and Cyclonic Weather.

Rs. 21 Lakhs.

Kalaighai Left & Right embankment
damaged at many places due to heavy
rainfall on 27.7.92. Due to high wave
splash on 30.7.92 sea-wall and pavement
damaged at digha.

approx.
Cost of Repair
in Rs. Lakhs.

Rupnarayan Right embankment

ANNEXURE - VI

LIST OF DAMAGES DURING FLOOD SEASON
OF 1992 IN HOOGHLY DISTRICT

<u>Description</u>	<u>Approx. Cost of Repair in Rs. Lakhs.</u>
Bank and Berm erosion of Different places on Darakeswar Right & Left embankment including Arambagh Town protection. Berm erosion of Shaikpur circuit embankment.	Rs. 28 Lakhs.

ANNEXURE - VII

LIST OF DAMAGES DURING FLOOD SEASON
OF 1993 IN HOOGHLY DISTRICT

<u>Description</u>	<u>Approx. Cost of Repair in Rs. Lakhs.</u>
Bank and Berm erosion of Different places on Darakeswar Right & Left embankment including Arambagh Town protection. Berm erosion of Shaikpur circuit embankment.	Rs. 28 Lakhs.

ANNEXURE - VIII

LIST OF DAMAGES DURING FLOOD SEASON
OF 1993 IN HOOGHLY DISTRICT

Description

ANNEXURE - VIF

Description

Approx. cost of
Repair in Rs. Lakhs.

Bank protective Work
of Spur No. 1 near Chankantapukuria
and at Thumjhumi on Rup. Left
embankment Erosion on Spurs
at Dwipmalita on Rup. Left
embankment.

4.50 Lakh.

ANNEXURE - VIF

Description

Approx. cost of
Repair in Rs. Lakhs.

Bank protective Work
of Spur No. 1 near Chankantapukuria
and at Thumjhumi on Rup. Left
embankment Erosion on Spurs
at Dwipmalita on Rup. Left
embankment.

4.50 - Lakh.

ANNEXURE - VIF

Description

Approx. cost of
Repair in Rs. Lakhs.

ANNEXURE-VIG

LIST OF DAMAGES DURING FLOOD SEASON OF 1992
IN PURULIA DISTRICT.

	<u>Amount</u> (Rs. in Lakhs)	<u>Total</u> (Rs. in Lakhs)
1. TURGA IRRIGN. SCHEME IN P.S. BAGMUNDI, DISTRICT - PURULIA.		
a) Protection work of Spillway repairing of Dam. ...	2.50	6.50
b) Closing of breaches, removal of rainwash, strengthening of canal and repairing of structures of REMC. ...	1.00	
c) Closing of breaches, removal of rainwashes, strengthening of canal, repairing of structures of LEMC. ...	3.00	
2. KESTOBAZAR IRRIGN. SCHEME IN P.S. BAGMUNDI, DISTRICT - PURULIA.		
a) Protection work of spillway at D/x side, repairing of Dam. ...	55.00	
b) Breach closing, repairing of struc- tures, removal of rainwash and strengthening of canal. ...	3.00	58.00
3. SANKHA IRRIGN. SCHEME IN P.S. BALRAMPUR, DISTRICT - PURULIA.		
a) Closing of breaches, protection work of weir, repairing of structures of canal and removal of rainwash. ...	3.00	
4. KUMARI IRRIGN. SCHEME IN P.S. BALRAMPUR, DISTRICT - PURULIA.		
a) Closing of breaches at different chainages of canal system. ...	6.00	
b) Repair of structures ...	6.00	32.00
c) Repair to Head works, protection of Dam, Dyke etc. ...	15.00	
d) Protection of Spillways. ...	5.00	

Contd....2

8. FAKIDI IRRIGN. SCHEME IN P.S. JHALDA, DISTRICT- PURULIA.				
a) Breaches at different chainages of the canal system (Main Canal & Distributories)	...	1.50	Y	
b) Restoration of different damaged structures including regulating gate	...	1.00	Y	2.50
9. KANSAI IRRIGN. SCHEME IN P.S. JHALDA, DISTRICT- PURULIA.				
a) Breaches at different chainages of canal system	1.50	Y	
b) Restoration to the different damaged structures including regulating gates	...	1.50	Y	4.00
c) Restoration to the damaged inspection path.	...	1.00	Y	
10. DIMU IRRIGN. SCHEME IN P.S. JHALDA, DISTRICT - PURULIA.				
a) Breaches at different chainages of the canal system (LBMC, RBMC & Distributories)-		1.00	Y	
b) Restoration to the different damaged structures.	...	4.00	Y	5.00
11. KARRIOR IRRIGN. SCHEME IN P.S. JHALDA, DISTRICT - PURULIA.				
a) Breaches at different chainages of the canal system (LBMC, RBMC)	...	2.00	Y	2.50
b) Restoration of the D/s. protection work of the spillway.	...	5.00	Y	XXXXXXXX
c) Restoration of the D/s protection work of the dam & dyke.	...	3.50	Y	15.00
d) Restoration to the damaged different structures of the canal system.	...	1.50	Y	4.00
e) Restoration to the damaged inspection path and top of the crest of dam & dyke...		3.00	Y	
12. KAIRABERA IRRIGN. SCHEME IN P.S. BAGMUNDU, DISTRICT - PURULIA.				
a) Protection of bank of main canal	...	3.00	Y	
b) Breach of canal bank of different chainages.	...	3.00	Y	8.00
b) Protection to structures	...	1.00	Y	10.00
d) Protection to dam, dyke & Spillway	...	2.00	Y	
e) Repair to approach road	...	1.50	Y	

13. <u>KULBERA IRRIGN. SCHEME IN P.S. BAGMUNDU,</u> <u>DISTRICT - PURULIA.</u>			
a) Protection of bank of canal system	...	2.00	Y Y Y 4.00
b) Repair to dam, dyke & Spillway	...	1.00	
c) Repair to dam, dyke & Spillway	...	1.00	
14. <u>Parga Irrign. Scheme in P.S. Jhalda,</u> <u>District - Purulia.</u>			
a) Restoration of the H.P. Gulvert on the approach road from Ranchi Road to wards dam site.	...	3.00	Y Y Y 8.00
b) Repair to the damaged protection work of D/s. spillway	...	3.00	
c) Repair to damaged canal bank of diff. chainages, repair to damaged foundation bed of Aqueduct and repair to other structures and removal of rain wash from canal bed.	...	2.00	
15. <u>BANDHU IRRIGN. SCHEME IN P.S. ARSA,</u> <u>DISTRICT - PURULIA.</u>			
a) Repairing of Bandhu Weir, Dyke, D/S flare wall, D/s. Protection work etc.	...	40.00	Y Y Y 105.00
b) Link Road between Dam site to Arsa Road.	...	15.00	
c) Repairing of breaches, cuts and restoration to canal embankments to designed section - Affected length of Canal - 8.00 KM.	...	20.00	
d) Repairing of breaches and rextation of structures including approaches	...	30.00	
16. <u>BARABHUM IRRIGN. SCHEME IN P.S.-</u> <u>BARABAZAR, DISTRICT - PURULIA.</u>			
a) Repairing of breaches, cuts and restoration to embankments to designed section including structures - Affected length - 4.00 KM Structures 10. Nos.	Y Y Y ...	12.00	Y Y 26.00
b) Repairing of Dam & Re-setting of pitching.	...	14.00	

17. <u>HANUMATA IRRIGN. SCHEME IN P.S. BALARAMPUR,</u> <u>DISTRICT - PURULIA.</u>			
a) Repairing of beaches, cuts and restoration to canal embankment to designed section including structures-			
Affected length	- 2 KM	Y	
Structures	- 10 Nos.	Y	...
			10.00
b) Repairing to Dam and re-setting of pitching.			
			...
			15.00
			Y
			Y
			Y
			25.00
			Y
18. <u>BEKO IRRIGN. SCHEME IN P.S. KASHIPUR,</u> <u>DISTRICT - PURULIA.</u>			
a) Repairing and restoration of Dam, Dyke, canal banks and structures etc.			
			...
			6.50
			6.50
19. <u>DAN GRA IRRIGN. SCHEME IN P.S. KASHIPUR,</u> <u>DISTRICT - PURULIA.</u>			
Damage repairing of head works and restoration of canal and its structures to different chainages.			
			...
			8.50
			8.50
20. <u>TATKO IRRIGN. SCHEME IN P.S. BANDWAN,</u> <u>DISTRICT - PURULIA.</u>			
a) Damaged repair of head works and restoration of canal and its structures in different chainages.			
			...
			15.00
			15.00
21. Minor damaged repair to other Schemes.			
			...
			10.00
1) Majra Irrign. Scheme.			
ii) Golamarajore Irrign. Scheme.			
iii) Lipania Irrign. Scheme			
iv) Fakidi Irrign. Scheme.			
v) Fuljhore Irrign. Scheme.			
			...
			15.00
			...
			25.50
vi) Bandajore Irrign. Scheme.			
vii) Taragonia Irrign. Scheme.			
TOTAL =			
			...
			6.50
			416.00
			6.50

19. <u>DAN GRA IRRIGN. SCHEME IN P.S. KASHIPUR,</u> <u>DISTRICT - PURULIA.</u>			
Damage repairing of head works and restoration of canal and its structures to different chainages.			
			...
			8.50
			8.50
20. <u>TATKO IRRIGN. SCHEME IN P.S. BANDWAN,</u> <u>DISTRICT - PURULIA.</u>			
a) Damaged repair of head works and restoration of canal and its structures in different chainages.			
			...
			15.00
21. Minor damaged repair to other Schemes.			
			...
			10.00
1) Majra Irrign. Scheme.			
ii) Golamarajore Irrign. Scheme.			
iii) Lipania Irrign. Scheme.			
iv) Fakidi Irrign. Scheme.			
v) Fuljhore Irrign. Scheme.			
			...
			15.00
			...
			25.50
vi) Bandajore Irrign. Scheme.			
vii) Taragonia Irrign. Scheme.			

A N N E X U R E - V I H.

LIST OF DAMAGES DURING FLOOD SEASON OF 1992
IN NADIA DISTRICT

Particulars of the Damages caused : to the Engineering works & Quantum of such Damages.	Approx. cost of : restoration.
---	-----------------------------------

- | | |
|---|------------------|
| 1.) Protective works to the
Right Bank of river Churni
at Gobindapur, Dist. Nadia.
- 30 Mtrs. | -Rs. 1.00 lacs |
| and at Bapujinagar, Dt. Nadia
(60 Mtrs.) | -Rs. 2.00 lacs. |
| 2. Protection works to the Left
Bank of river Bhagirathi at
Ghusuridanga, Sarakhali, Juran-
pur, Mayapur, and Paschim
Mayapur and Paschim Mayapur
(1500 Mtrs.) in Dist. Nadia. | -Rs. 40.00 lacs. |
| <hr/> | |
| Total for Nadia District :- | Rs. 48.00 lacs. |
-

A N N E X U R E - V I - I.

LIST OF DAMAGES DURING FLOOD SEASON OF 1992
IN MURSHIDABAD DISTRICT

Particular of the Damages Caused : to the Engineering works & Quantum of such Damages.	Approx. cost of restoration.
--	---------------------------------

- | | |
|---|-----------------|
| 1) Damages in the shape of erosion,
raincuts, slips etc. at places
of Kandi Indra Daugapara, Gangadha
circuit embankment, Andulia,
Bagadanga tagging embankment,
Chandpur Kolla embankment, Gadda-
Kashipur embankment, in P.S. Kandi
District- Murshidabad. | Rs. 5.00 lacs. |
| 2) -do- -do- -do- of Titidanga,
Juran Kandi embankment, Gantla
Rameswarpur embankment Gobarhati
Katirpohar embankment, Natatola-chowri-
gacha embankment in P.S. Berhampore,
District- Murshidabad. | Rs. 4.00 lacs. |
| 3) Damages to the protection works,
the sluices, etc. under Berhampore
Irrigation Division in District-
Murshidabad. | Rs. 10.00 lacs. |

contd...p/2

4. Damages to the Bank protection and Anti-erosion works at mouza Kuli, Sankopara, Anantapur, Furapara, Chakmaghwan, R Islampur, Kankramari, covering a total length of 5870.00 mtrs. Rs.350 lacs.

Total for Murshidabad District :- Rs.369 lacs

ANNEXURE - VI-J

LIST OF DAMAGES DURING FLOOD SEASON OF 1992

IN MALDAH DISTRICT

Particulars of the Damages caused : to the Engineering works & quantum of such Damages.	Approx. cost of : restoration.
1). Damages in the form of slips, raincuts, in the spill checking embankment on the Left Bank of River Ganga, u/s. of Farakka Barrage (2 Km), P.S. Kaliachak.	Rs. 6.00 lacs.
2) -do- -do- -do- to the marginal embankment on the Left Bank of River Ganga, u/s. of Farakka Barrage in P.S. Manikchak (5.00 Km.)	Rs. 15.00 lacs.
3) -do- -do- -do- to the Forward embankment u/s. of Farakka Barrage in P.S. Kalichak (1.00 km.)	Rs. 2.00 lacs.
4) -do- -do- -do- to the tagging embankment of spur no.8 in P.S. Kaliachak.	Rs. 4.00 lacs.
5) -do- -do- -do- to Khuria-daha and Mashaldighi to Mariakundu embankment in P.S. Gazole (3.00 km.)	Rs. 4.00 lacs.
6) -do- -do- -do- to Ranjan beel embankment in P.S. Gazole (2.00 km)	Rs. 2.00 lacs.
7) Damages in the form of Choges, raincuts, slips etc. to left Fulahar embankment in Dt. Malda.	Rs. 7.00 lacs.
8) -do- -do- -do- to Mahamanda embankment at places in District Malda	Rs.11.00 lacs.
9) Damages to Lykol Khal embankment & Sambalpur Circuit embankment in District Malda.	Rs. 4.00 lacs.
10) Damages due to erosion to the Bank protective works of Left-Fulahar embankment, at Khopakati, in District, Malda.	Rs. 2.00 lacs.
Total for Malda Irrigation :-	Rs.57 lacs.

ANNEXURE -VI K.

LIST OF DAMAGES DURING FLOOD SEASON OF 1992
IN UTTAR & DAKSHIN DINAJPUR DISTRICT

Particulars of the Damage Caused :-
to the Engineering works & Quantum
of such Damages.

Approx. cost of
restoration.

1) Damages to embankment (5.00 Km)	Rs. 27.00 lacs.
2) Damages to the sluices(15 Km.)	Rs. 6.00 lacs.
3) Damages to the Bank protective works. (400 mtrs.)	Rs. 18.00 lacs.
4) Damages to the spurs and Bed Bars (10 Nos.)	Rs. 4.00 lacs.
5) Repairs to Buildings. (7 nos.)	Rs. 2.00 lacs.
6) Damages to Departmental Roads and Inspection Path(4.00 Km.)	Rs. 1.00 lac
Total for Uttar & Dakshin Dinajpur Dt.	Rs. 58.00 lacs.

Particulars of the Damage Caused :- to the Engineering works & Quantum of such Damages.	Approx. cost of restoration.
1) Damages to embankment (5.00 Km)	Rs. 27.00 lacs.
2) Damages to the sluices(15 Km.)	Rs. 6.00 lacs.
3) Damages to the Bank protective works. (400 mtrs.)	Rs. 18.00 lacs.
4) Damages to the spurs and Bed Bars (10 Nos.)	Rs. 4.00 lacs.
5) Repairs to Buildings. (7 nos.)	Rs. 2.00 lacs.
6) Damages to Departmental Roads and Inspection Path(4.00 Km.)	Rs. 1.00 lac
Total for Uttar & Dakshin Dinajpur Dt.	Rs. 58.00 lacs.